

# OFF-CHANNEL HABITAT MARK RE- CAPTURE PROGRAM

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## 1.0 Introduction

This document summarizes a proposed minnow trap mark re-capture program in the following off - channel habitats of the Dave Marshall Salmon Reserve in the lower Cheakamus River:

- Kisutch refuge channels
- Gorbusha east channel
- Gorbusha west channel
- BCR Mile 49 Channel

The purpose of the mark re-capture program is to characterize post-spill salmonid populations in selected off-channel habitats of the lower Cheakamus River, and to provide a complement to the annual juvenile salmon migration assessment program being conducted by Instream Fisheries Research Inc. for BC Hydro and CN. As the main target species of the constructed restoration channels were coho salmon (*Oncorhynchus kisutch*) it is anticipated this will be the most abundant species captured and the mark re-capture program is being proposed with the intention to target this species. However data will be collected on all species captured including char (*Salvelinus sp.*) and other non-salmonids to contribute to available data sets for all species in the Cheakamus River.

The proposed 2006 off-channel mark re-capture program is based on a review of procedures described by Foy *et al.* (2002). In 2001, Fisheries and Oceans Canada (DFO) conducted weir and minnow trap mark re-capture programs in a variety of off-channel habitats in the lower Cheakamus, including the Kisutch channel, and the BCR Mile 49 channel. This program was also conducted concurrently with annual juvenile salmon migration assessment program being conducted by Instream Fisheries Research Inc. for BC Hydro (Melville and McCubbing 2005).

Since much of the proposed project area is located on North Vancouver Outdoor School (NVOS) property, trapping efforts and activities will require approval and coordination with NVOS staff. Liability consideration, and contractor training requirements for access along CN property will likely prohibit the use of volunteers to assist with studies requiring access along CN property (BCR Mile 49 channel). However the possibility of using volunteers or collaborating with the NVOS to conduct mark re-capture surveys is a viable consideration to improve efficiencies and increase public involvement. If such opportunities are identified, volunteers will be expected to supplement existing trained staff working on the project, and all activities and fish identification will be overseen by at least one trained staff member.

## 2.0 Fish Surveys

During the 2001 DFO and BC Hydro study (Foy *et al.* 2002), the minnow trap mark recapture program was conducted from early to mid April. Discussions with DFO in preparation for this project indicated this timing may have been slightly too late as coho outmigration was thought to have commenced during the early part of the project (Matt Foy pers. comm.). In addition, the proposed 2006 program will cover more channels and will require additional time to complete.

Therefore, the 2006 study proposes to advance the timing of the mark re-capture program by two weeks, and is expected to encompass the period from mid March to early April. The final timing of field trapping will also be determined based on observed weather patterns and discharge conditions.

Due to the expected large number of traps to be deployed and requirements for fish sampling and marking, fish surveys will be conducted, by a five (5) person sampling crew to maximize efficiencies. A five person crew will allow for two crew members to retrieve and re-deploy minnow traps while a three person crew measures and marks fish for subsequent release. In this way it is expected that the sampling crew will be able to retrieve and re-deploy 50 traps per day.

## 2.1 Minnow Trapping Methods

Each waterbody will be sampled twice, first to mark fish and second to enumerate marked and unmarked fish. The minnow trapping effort in each sampling area will reflect trapping effort in the BCR Mile 49 channel surveyed as part of the 2001 off-channel mark recapture program. A minimum of 10 and maximum of 15 baited minnow traps / 100 m will be set in each of the waterbodies (Table 1). The traps will be baited with 2 g of salmon roe and set overnight for approximately 24 hours. Trap locations will be marked in the field and geo-referenced using hand held geographic positioning (GPS) units. Other data recorded at each trapping location will include hydraulic unit type (riffle, pool, glide), trap depth, proximity of nearby cover features and cover type.

**Table 1. Estimated number of traps set in each waterbody**

Location	Estimated Waterbody length (m)	Estimated # of traps
Kisutch	580	70
Gorbuscha W	750	90
Gorbuscha E	488	60
Mile 49	360	50

## 2.2 Fish Marking and Measurements

Captured fish will be anaesthetized, identified to species and enumerated. A subset of fish from each species will be weighed and measured for length, and all salmonids will be marked. Marking strategies will be developed in consultation with Instream Fisheries Research Inc. to ensure consistency with marking procedures being used at downstream migration traps in other restoration channels, and to allow differentiation of fish recaptured at the RST's from various off channel habitats.

Captured fish will be allowed to recover in aerated buckets and will be released for subsequent re-sampling. No live fish will be sacrificed for voucher specimens. However, any inadvertent mortalities will be recorded and if requested could be retained for voucher specimens.

### 3.0 Data Compilation and Analyses

Sampling data will be used to derive a Petersen mark re-capture estimate of coho smolt abundance and generate descriptive statistics for other species where appropriate. Data analyses, presentation and discussion will be consistent with the Foy *et al.* 2002 study and other fish and fish habitat studies conducted in the Cheakamus River, as follows:

- Number of fish marked versus the number recovered for each sampled species
- Summary of estimated fry and smolt production including densities of fish per m<sup>2</sup> and km
- Densities of fish in all sampling areas (expressed as fish / m<sup>2</sup>)
- Summary of daily catch by species, and by where available by habitat type
- Mean and standard deviation of length, length~weight and length~frequency data
- Habitat preferences in the surveyed areas, where sufficient data exists to show preference

### 4.0 Reporting

The results of the mark re-capture program will be summarized in a technical data report and will be presented in tabular or graphical format as appropriate. All information on number of fish marked and bio-physical information from captured fish will be also be provided to Instream Fisheries Research Inc for inclusion in the juvenile salmon migration assessment report.

### 5.0 References

Foy M. Beardmore H., Gidora S. 2002. Cheakamus River Coho Salmon Production From Constructed Off-Channel Habitat, 2001 Resource Restoration Group, Habitat and Enhancement Branch Lower Fraser Area, Pacific Region, Fisheries and Oceans Canada

Melville, Caroline and McCubbing Don, 2005. Assessment of the 2004 Juvenile Salmon Migration In the Cheakamus River, using Rotary Traps, Prepared for BC Hydro